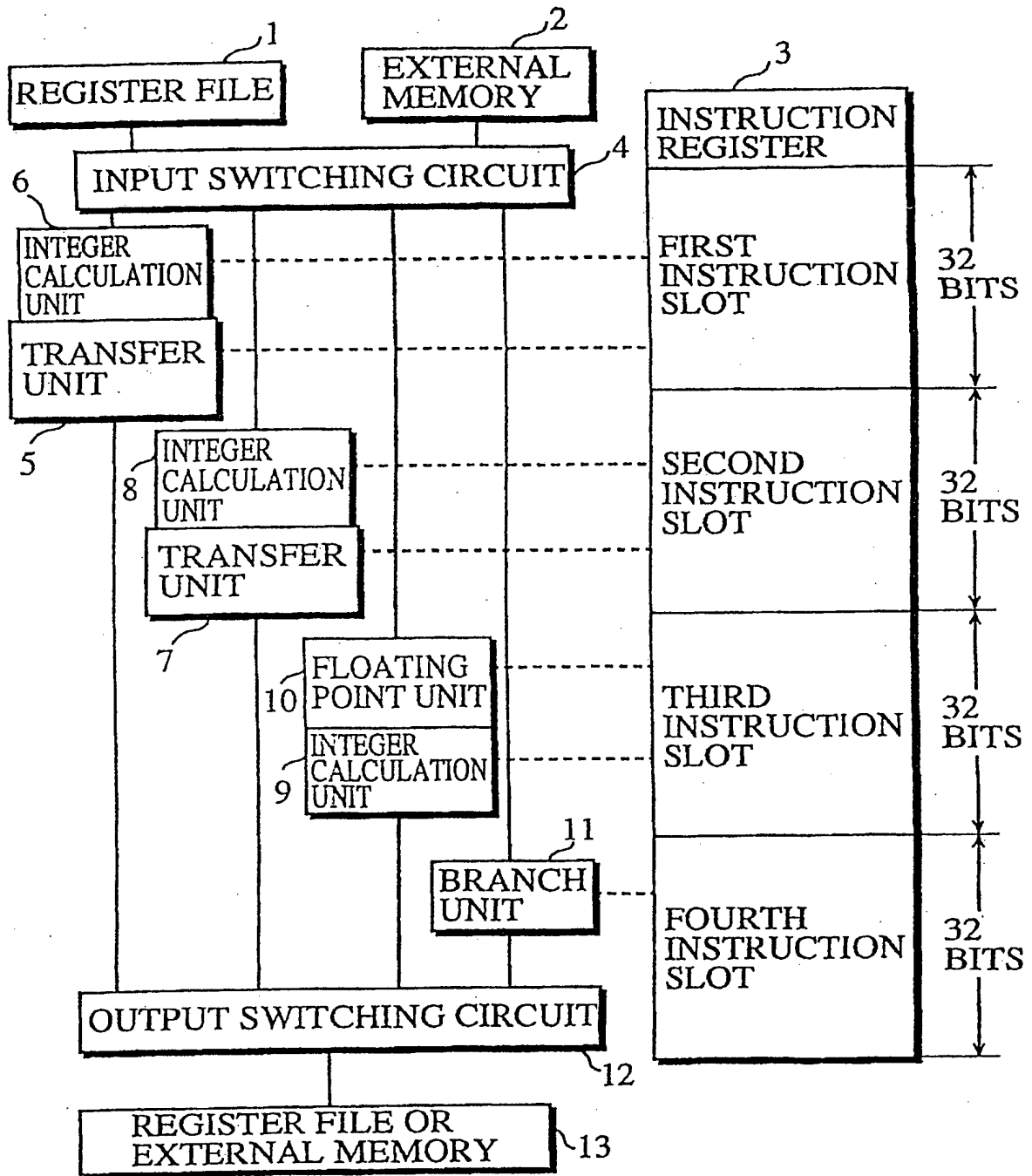


FIG. 1



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FIG. 2 LONG-WORD INSTRUCTION(TWO INSTRUCTIONS)

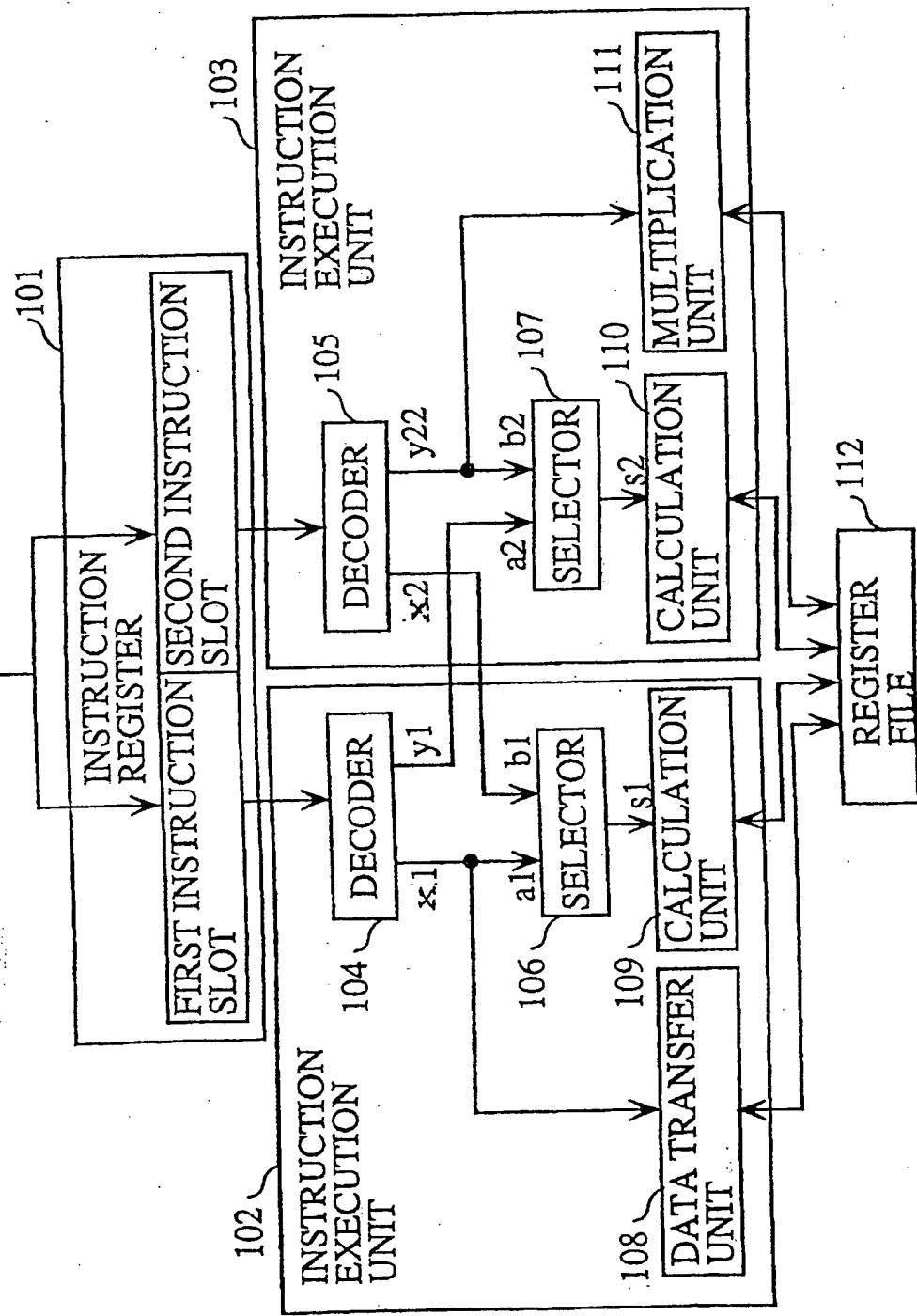


FIG. 3

INSTRUCTION

| FIRST FIELD | SECOND FIELD | THIRD FIELD |
|-------------|--------------|-------------|
| nop | 0 | 0 |
| mov | Rn | Rm |
| add | Rn | Rm |
| sub | Rn | Rm |
| adsb | Rn | Rm |
| mul | Rn | Rm |

FIG. 4

INSTRUCTION SETS

| INSTRUCTION | MNEMONIC | PROCESSING CONTENT | ALLOCATED SLOT | |
|------------------------------|-------------|--|-------------------|---------|
| | | | FIRST? | SECOND? |
| DATA TRANSFER INSTRUCTION | mov Rn,Rm | TRANSFER DATA FROM Rn TO Rm | YES | NO |
| ADD INSTRUCTION | add Rn,Rm | STORE $Rm + Rn$ IN Rm | YES | YES |
| SUBTRACT INSTRUCTION | sub Rn,Rm | STORE $Rm - Rn$ IN Rm | YES | YES |
| ADD-SUBTRACT INSTRUCTION | adsub Rn,Rm | STORE $Rm + Rn$ IN Rn AND $Rm - Rn$ IN Rm | YES | YES |
| MULTIPLY INSTRUCTION | mul Rn,Rm | STORE $Rm * Rn$ IN Rm | NO | YES |
| NO-OPERATION INSTRUCTION | nop | NO OPERATION | YES | YES |

FIG. 5

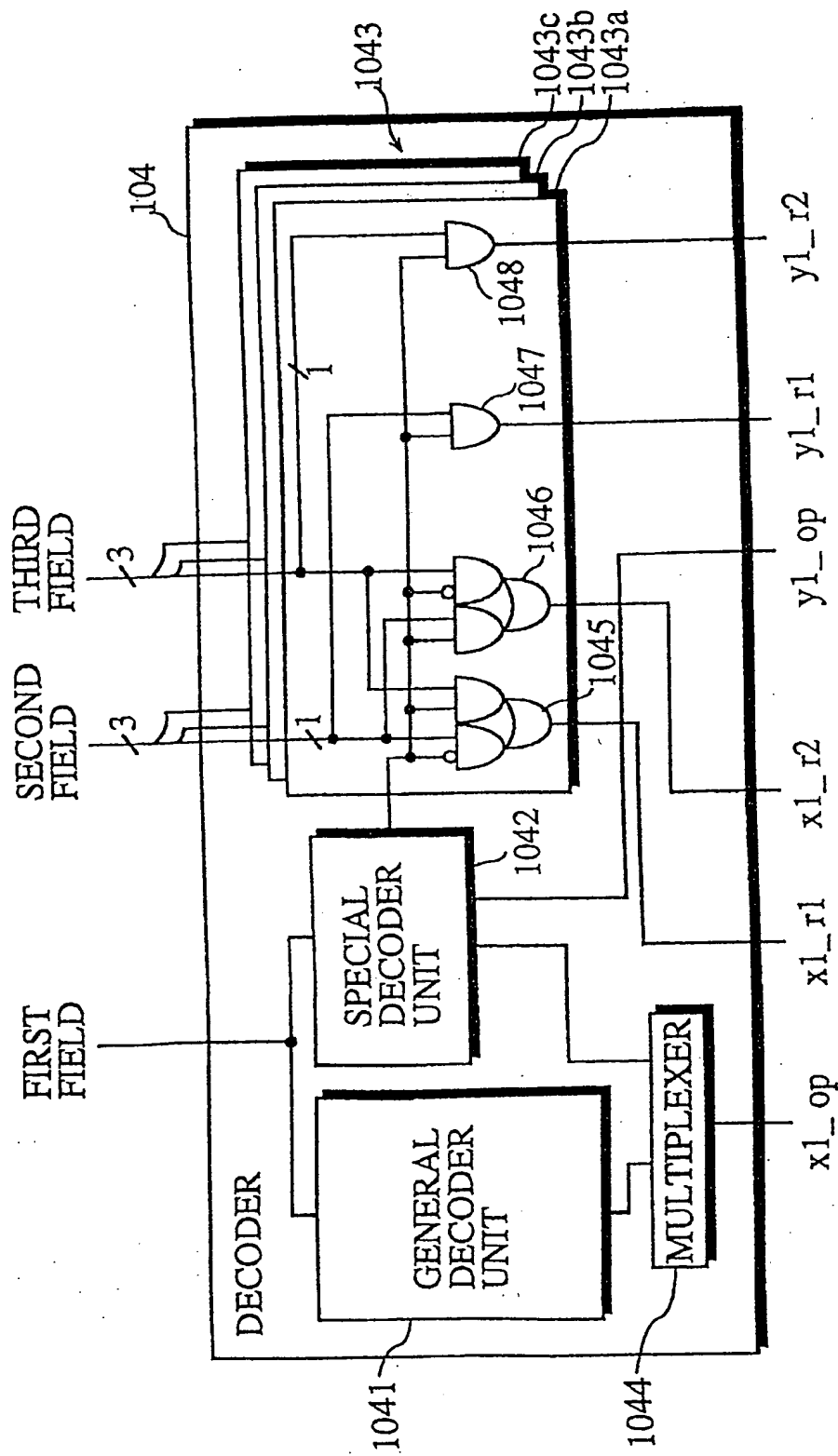


FIG. 6

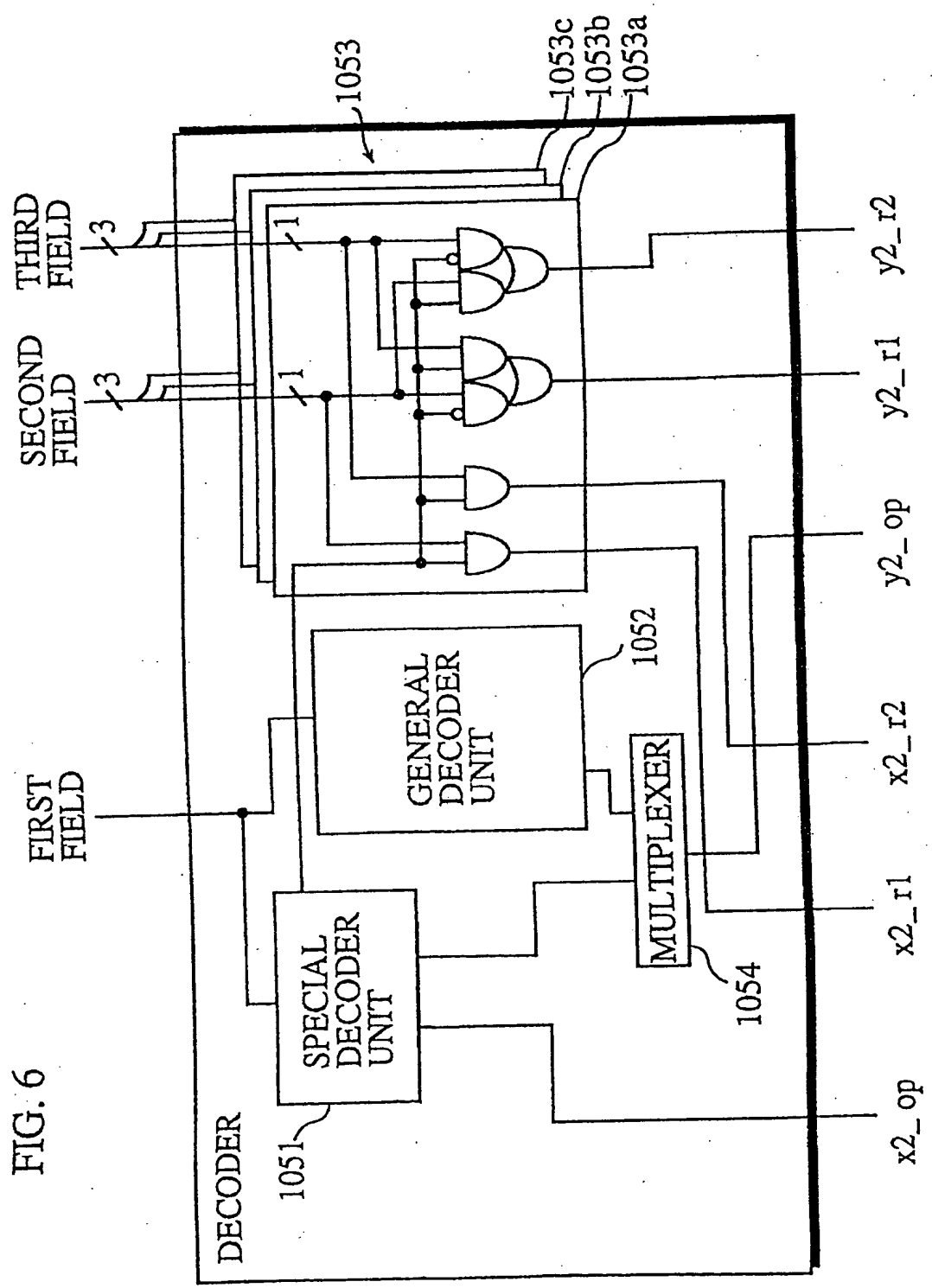


FIG. 7

OPERATION OF DECODER 104

| INPUT | OUTPUT x1 | | OUTPUT y1 | |
|---------------|--------------|-----|--------------|-----|
| | op | r1 | op | r1 |
| mov Rn1, Rm1 | TRANSFER | Rn1 | NO OPERATION | -- |
| add Rn1, Rm1 | ADD | Rn1 | NO OPERATION | -- |
| sub Rn1, Rm1 | SUBTRACT | Rn1 | NO OPERATION | -- |
| adzb Rn1, Rm1 | ADD | Rm1 | SUBTRACT | Rm1 |
| nop | NO OPERATION | -- | NO OPERATION | -- |

FIG. 8

OPERATION OF DECODER 105

| INPUT | OUTPUT x2 | | | OUTPUT y2 | | |
|---------------|--------------|-----|-----|--------------|-----|-----|
| | op | r1 | r2 | op | r1 | r2 |
| add Rn2, Rm2 | NO OPERATION | -- | -- | ADD | Rn2 | Rm2 |
| sub Rn2, Rm2 | NO OPERATION | -- | -- | SUBTRACT | Rn2 | Rm2 |
| adsh Rn2, Rm2 | SUBTRACT | Rn2 | Rm2 | ADD | Rm2 | Rn2 |
| mul Rn2, Rm2 | NO OPERATION | -- | -- | MULTIPLY | Rn2 | Rm2 |
| nop | NO OPERATION | -- | -- | NO OPERATION | -- | -- |

FIG. 9

OPERATION OF SELECTOR 106

| INPUT a1 | | | INPUT b1 | | | OUTPUT | | |
|------------------|-------|-------|--------------|-------|-------|--------------|-------|-------|
| x1_op | x1_r1 | x1_r2 | x2_op | x2_r1 | x2_r2 | s1_op | s1_r1 | s1_r2 |
| (1) ADD | Rn1 | Rm1 | NO OPERATION | -- | -- | ADD | Rn1 | Rm1 |
| (2) SUBTRACT | Rn1 | Rm1 | NO OPERATION | -- | -- | SUBTRACT | Rn1 | Rm1 |
| (3) ADD | Rm1 | Rn1 | NO OPERATION | -- | -- | ADD | Rm1 | Rn1 |
| (4) TRANSFER | Rn1 | Rm1 | NO OPERATION | -- | -- | TRANSFER | Rn1 | Rm1 |
| (5) TRANSFER | Rn1 | Rm1 | SUBTRACT | Rn2 | Rm2 | SUBTRACT | Rn2 | Rm2 |
| (6) NO OPERATION | -- | -- | SUBTRACT | Rn2 | Rm2 | SUBTRACT | Rn2 | Rm2 |
| (7) NO OPERATION | -- | -- | NO OPERATION | -- | -- | NO OPERATION | -- | -- |

FIG. 10

OPERATION OF SELECTOR 107

| INPUT a2 | | | INPUT b2 | | | OUTPUT | | |
|------------------|-------|-------|--------------|-------|-------|--------------|-------|-------|
| y1_op | y1_r1 | y1_r2 | y2_op | x2_r1 | x2_r2 | s2_op | s2_r1 | s2_r2 |
| (1) NO OPERATION | -- | -- | ADD | Rn2 | Rm2 | ADD | Rn2 | Rm2 |
| (2) NO OPERATION | -- | -- | SUBTRACT | Rn2 | Rm2 | SUBTRACT | Rn2 | Rm2 |
| (3) NO OPERATION | -- | -- | ADD | Rm2 | Rn2 | ADD | Rm2 | Rn2 |
| (4) SUBTRACT | Rn1 | Rm1 | MULTIPLY | Rn2 | Rm2 | SUBTRACT | Rn1 | Rm1 |
| (5) SUBTRACT | Rn1 | Rm1 | NO OPERATION | -- | -- | SUBTRACT | Rn1 | Rm1 |
| (6) NO OPERATION | -- | -- | MULTIPLY | Rn2 | Rm2 | MULTIPLY | Rn2 | Rm2 |
| (7) NO OPERATION | -- | -- | NO OPERATION | -- | -- | NO OPERATION | -- | -- |

FIG. 11

OPERATION OF DATA TRANSFER UNIT 108

| INPUT | | | OPERATION CONTENT |
|----------|-------|-------|-------------------------------------|
| X1_op | x1_r1 | x1_r2 | |
| TRANSFER | Rn1 | Rm1 | TRANSFER DATA FROM Rn1 TO Rm1 |

FIG. 12

OPERATION OF CALCULATION UNIT 109

| INPUT | | | OPERATION CONTENT |
|--------------|-------|-------|--------------------------|
| s1_op | s1_r1 | s1_r2 | |
| (1) ADD | Rn1 | Rm1 | STORE $Rm1 + Rn1$ IN Rm1 |
| (2) SUBTRACT | Rn1 | Rm1 | STORE $Rm1 - Rn1$ IN Rm1 |
| (3) ADD | Rm1 | Rn1 | STORE $Rn1 + Rm1$ IN Rn1 |
| (4) SUBTRACT | Rn2 | Rm2 | STORE $Rm2 - Rn2$ IN Rm2 |

FIG. 13

OPERATION OF CALCULATION UNIT 110

| INPUT | | | OPERATION CONTENT |
|--------------|-------|-------|--------------------------|
| s2_op | s2_r1 | s2_r2 | |
| (1) ADD | Rn2 | Rm2 | STORE $Rm2 + Rn2$ IN Rm2 |
| (2) SUBTRACT | Rn2 | Rm2 | STORE $Rm2 - Rn2$ IN Rm2 |
| (3) ADD | Rm2 | Rn2 | STORE $Rn2 + Rm2$ IN Rn2 |
| (4) SUBTRACT | Rn1 | Rm1 | STORE $Rm1 - Rn1$ IN Rm1 |

FIG. 14

OPERATION OF MULTIPLICATION UNIT 111

| INPUT | | | OPERATION CONTENT |
|----------|-------|-------|--------------------------|
| y2_op | y2_r1 | y2_r2 | |
| MULTIPLY | Rn2 | Rm2 | STORE $Rm2 * Rn2$ IN Rm2 |

FIG. 15

1. $b[0] = a[0] + a[3]$
2. $b[1] = a[1] + a[2]$
3. $b[2] = a[1] - a[2]$
4. $b[3] = a[0] - a[3]$
5. $c[0] = (b[0] + b[1]) * f0$
6. $c[1] = (b[0] - b[1]) * f0$
7. $c[2] = b[2] * (f1 - f2) + (b[2] + b[3]) * f2$
8. $c[3] = b[3] * (f1 + f2) - (b[2] + b[3]) * f2$

FIG. 16

VALUES OF PROGRAM VARIABLES
STORED IN REGISTERS

| REGISTER | VARIABLE |
|----------|----------|
| R0 | a[0] |
| R1 | a[1] |
| R2 | a[2] |
| R3 | a[3] |
| R4 | f0 |
| R5 | f1 - f2 |
| R6 | f1 + f2 |
| R7 | f2 |

| LONG-WORD INSTRUCTION | FIRST INSTRUCTION SLOT | SECOND INSTRUCTION SLOT |
|--------------------------|---------------------------|----------------------------|
| 1. | adzb R2, R1 | nop |
| 2. | mov R1, R8 | adzb R3, R0 |
| 3. | mov R0, R9 | mul R5, R1 |
| 4. | add R9, R8 | mul R6, R0 |
| 5. | adzb R2, R3 | mul R7, R8 |
| 6. | add R8, R1 | mul R4, R2 |
| 7. | sub R8, R0 | mul R4, R3 |

FIG. 18

| LONG-WORD INSTRUCTION | FIRST INSTRUCTION SLOT | SECOND INSTRUCTION SLOT |
|--------------------------|---------------------------|----------------------------|
| 1. | mov R1, R8 | sub R2, R1 |
| 2. | mov R0, R9 | sub R3, R0 |
| 3. | mov R1, R10 | mul R5, R1 |
| 4. | mov R0, R11 | mul R6, R0 |
| 5. | add R11, R10 | add R2, R8 |
| 6. | add R3, R9 | mul R7, R10 |
| 7. | add R10, R1 | sub R10, R0 |
| 8. | mov R9, R12 | add R8, R9 |
| 9. | sub R8, R12 | mul R4, R9 |
| 10. | nop | mul R4, R12 |

FIG. 19

